

### **AMENDMENTS TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. - 11. (Canceled)

12. (Currently Amended) A plasma fuel reformer assembly for producing reformat gas, the fuel reformer assembly comprising:

a plasma fuel reformer having (i) an air/fuel input assembly, ~~and~~ (ii) an electrode assembly comprising a first electrode and a second electrode that is spaced apart from the first electrode, and (iii) a soot trap positioned downstream of the electrode assembly, and

a reformer controller electrically coupled to the air/fuel input assembly, the controller comprising (i) a processing unit, and (ii) a memory unit electrically coupled to the processing unit, the memory unit having stored therein a plurality of instructions which, when executed by the processing unit, causes the processing unit to:

operate the air/fuel input assembly so as to advance a first air/fuel mixture with a first air-to-fuel ratio into the plasma fuel reformer,

determine if a soot purge of the soot trap is to be performed and generate a purge-soot signal in response thereto, and

operate the air/fuel input assembly so as to advance a second air/fuel mixture having a second air-to-fuel ratio greater than the first air-to-fuel ratio into the plasma fuel reformer.

13. (Currently Amended) The plasma fuel reformer assembly of claim 12, wherein the air/fuel input assembly comprises a fuel injector, and the reformer controller is electrically coupled to the fuel injector.

14. (Currently Amended) The plasma fuel reformer assembly of claim 12, wherein the air/fuel input assembly comprises an electrically-operated air inlet valve, and the reformer controller is electrically coupled to the air inlet valve.

15. (Currently Amended) The plasma fuel reformer assembly of claim 12, further comprising a sensor to sense the amount of soot within the soot trap, wherein the plurality of instructions, when executed by the processing unit, further causes the processing unit to:

generate a soot-content control signal when the amount of soot particulate accumulation within the soot trap reaches a predetermined level, and

operate the air/fuel input assembly to advance the second air/fuel mixture in response to generation of the soot-content control signal.

16. (Currently Amended) The plasma fuel reformer assembly of claim 12, further comprising a pressure sensor to sense the pressure drop across the soot trap, wherein the plurality of instructions, when executed by the processing unit, further causes the processing unit to:

generate a pressure-reached control signal when the pressure drop across the soot trap reaches a predetermined level, and

operate the air/fuel input assembly to advance the second air/fuel mixture in response to generation of the pressure-reached control signal.

17. (Currently Amended) The plasma fuel reformer assembly of claim 12, wherein the plurality of instructions, when executed by the processing unit, further causes the processing unit to:

determine when a predetermined period of time has elapsed since soot was last purged from the soot trap, and generate a time-lapsed control signal in response thereto, and

operate the air/fuel input assembly to advance the second air/fuel mixture in response to generation of the time-lapsed control signal.

18. (Canceled)

19. (Currently Amended) The plasma fuel reformer assembly of claim 12, wherein the plasma fuel reformer comprises a housing defining a reformat gas outlet, and the soot trap is positioned within the housing at a position upstream of the reformat gas outlet.

20. (Currently Amended) The plasma fuel reformer assembly of claim 12, further comprising a conduit fluidly coupled to the plasma fuel reformer, wherein the soot trap is positioned within the conduit.

21. - 28. (Canceled)